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Bridging Crisis and Care on the Frontline: A Study of the Paramedic Communication Curriculum

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Abstract

With the recent expansion of the scope of duties for Paramedics, acquiring advanced communication skills and the ability to support interprofessional collaboration has become a critical educational challenge in emergency medical training. The purpose of this study is to verify the educational effects of a newly established course, "Paramedic Communication," introduced for second-year undergraduate students starting in the 2023 academic year. By analyzing students' perceptions in detail, this study clarifies the course's impact on their knowledge of communication, understanding of interprofessional work, and development of ethics, while providing specific suggestions for future curriculum improvement. As a result of the analysis, the mean value for all 23 items was 4.30 or higher (maximum 5.0), indicating an extremely high educational effect. In particular, "Q23. I was able to hold discussions in a group" was the highest at 4.74 (SD 0.44), and statistical analysis showed a significantly higher evaluation compared to 18 other items ($p < 0.05$). On the other hand, no significant difference was observed with the four items: "Q6. Interprofessional work," "Q12. Counseling," "Q13. Pre-hospital care situations," and "Q22. Sequence of events," revealing that these were evaluated equally highly. It is considered that this course contributed significantly to the foundation of complex communication skills required for Paramedics by incorporating exercises using role-playing and group work in addition to knowledge transfer through lectures, thereby promoting students' active participation. In particular, the deepened understanding of communication in "interprofessional work" and the "sequence of activities," which are issues in the field, is an important educational outcome for future practice.

Keywords

Crisis and Care, Paramedic Communication, Curriculum

1. Introduction

In Japan's emergency medical system, paramedics play a vital role in performing rapid and accurate emergency procedures on the sick and injured under extreme conditions, such as accident sites and disaster scenes. For many years, the activities of paramedics were mainly limited to pre-hospital care. However, with the recent amendment of the Emergency Life-Saving Technicians Act, their scope of duties has expanded significantly. Specifically, it has become legally possible to perform emergency life-saving measures under the specific instructions of a physician within hospitals, particularly in Emergency Rooms (ERs). This expansion of duties leads to the expectation that paramedics will function more organically as members of the emergency medical team, but simultaneously, it demands the acquisition of more advanced and diverse communication skills than ever before. Regarding the communication challenges faced by paramedics, several prior studies have highlighted the current situation and difficulties. According to Takeda (2005), active paramedics feel a specific difficulty in building relationships with hospital staff, such as physicians and nurses. Physicians and nurses work daily in the same hospital space and can build continuous communication within a face-to-face relationship. In contrast, paramedics, who mainly operate at sites outside the hospital or in ambulances, must convey accurate information to hospital staff (physicians and nurses) and establish communication based on trust within the extremely short time of transporting the sick or injured to the hospital. This "time constraint" and "difference in affiliation" act as communication barriers for paramedics.

Furthermore, paramedics also recognize difficulties in communication with the sick or injured themselves and their families. Takahashi et al.'s research (Takahashi, 2015; Takahashi et al., 2006) reports that paramedics feel difficulty in psychological support and explaining the situation to families at the scene, and they feel that they did not receive sufficient education regarding such communication in the curriculum they underwent. As a result, there is a current situation where many active paramedics have a strong desire to participate in post-graduate communication skill seminars. This suggests that practitioners in the field are aware of their lack of communication skills and crave learning opportunities to compensate for it. In other words, Paramedics responsible for practical work on the front lines of emergency sites face communication difficulties in both aspects: responding to the sick/injured and families, and coordinating with multiple professions.

In the research by Kubota et al. (Kubota, 2021a, 2021b, 2021c; Kubota & Nemoto, 2021; Kubota & Suzuki, 2021; Kubota & Suzuki, 2022a, 2022b), trends in educational content in university paramedic training courses and the difficulties

recognized by field Paramedics were summarized. The results extracted that paramedics struggle with communication toward the sick/injured, patients, families, and medical professionals, and they wish to learn knowledge about communication that can be utilized in their duties as paramedics.

In light of recent issues in paramedic education, the department, established in 2022, has focused on optimizing its curriculum from the outset. Consequently, in the 2023 academic year, it was decided to open a newly established subject, "Paramedic Communication," for the first time for new second-year students.

In designing this course, the content was designed to question the essence of communication in the emergency life-saving field, rather than merely acquiring conversation techniques. Specifically, the following points are the pillars of learning. First is the formation of a helping relationship with the sick/injured and their families, centered on emergency and disaster medicine. Students learn how communication should be, equipped with a caring heart and high ethical standards. Second is the contribution to team medicine. Students deepen their understanding of the significance and practice of interprofessional work and acquire smooth communication methods in settings such as conferences. Third is the acquisition of practical skills and self-reflection. As part of the class, role-playing, assuming specific situations in the emergency life-saving field, is conducted. Through feedback within the group, the aim is for students to notice the characteristics and issues of their own communication and cultivate the power to reflect on themselves.

Second-year students at this university have previously completed basic emergency life-saving studies, such as the basics of emergency medicine, disaster medicine, and the role of their own profession. This course aims to develop classes that students aspiring to be Paramedics can feel are "truly useful in the field," based on that previously learned knowledge. This study is conducted to verify the educational effect of this newly opened subject. Specifically, the purpose is to investigate and analyze in detail the students' perception and degree of understanding regarding the class objectives, and based on the results, obtain educational suggestions for reconstructing the subject into a more enriching one for the next academic year and beyond. Furthermore, the findings obtained will be widely disseminated through academic conferences and other means as a model case for communication education in future Paramedic education.

2. Research Methods

2.1. Subjects

42 second-year students enrolled in the Department of Emergency Medical Science, Faculty of Health Science, Suzuka University of Medical Science in the 2023 academic year, who registered for the first-semester course "Paramedic Communication".

2.2. Survey Period

July to September 2023. Conducted on the final class day of the subject.

2.3. Class and Survey Content

This course consisted of 15 sessions in total. After learning about the foundations of communication, emotion, decision-making support, teamwork, interprofessional work, role theory, consultation, conferences, etc., through lectures and exercises, simulation exercises were conducted for each scene: pre-hospital, inside the ambulance, upon hospital arrival, and ER/ICU. The summary of the course content (syllabus) is shown in Table 1.

Table 1. "Paramedic Communication" course content (syllabus).

Lesson	Lecture content
1	Guidance/Regarding the foundation of communication
2	Communication specific to fire services/Knowledge regarding communication for Paramedics
3	Regarding emotion/Abilities related to emotion
4	Regarding messages, Human relations, teamwork, interprofessional work/Regarding the role of medical professionals
5	Consultation, Coordination/Theories and models regarding communication
6	Communication in pre-hospital care situations
7	Communication in pre-hospital care situations_Exercise
8	Communication inside the ambulance and upon hospital arrival
9	Communication inside the ambulance and before hospital arrival_Exercise
10	Communication in the ER (Emergency Room) and Critical Care ICU (Intensive Care Unit)
11	Communication in the ER and Critical Care ICU_Exercise
12	What is counseling
13	Communication in emergency life-saving (Communication in the sequence of "Pre-hospital care situation—Inside ambulance—Upon hospital arrival")
14	Communication in emergency life-saving "Pre-hospital care situation—Inside ambulance—Upon hospital arrival" Sequence of events communication_Role-playing
15	Communication in emergency life-saving "Pre-hospital care situation—Inside ambulance—Upon hospital arrival" Sequence of events communication_Role-playing Overall Presentation

2.4. Questionnaire Content

For the survey, a unique questionnaire created based on the above class achievement objectives was used. The question items consisted of 23 multiple-choice questions asking about the understanding of learning content and 1 free-description item. For the multiple-choice questions, responses were requested using a 5-point Likert scale ranging from "Strongly agree (5 points)" to "Disagree (1 point)" regarding the degree of understanding of each unit, from "1. I was able to understand communication in the emergency field" to "23. I was able to hold discussions in a group".

The content of the questionnaire is shown in Table 2.

Table 2. Questionnaire content.

Question No.	Question Content
1	I was able to understand communication in the emergency field.
2	I was able to understand emotion.
3	I was able to understand decision-making support.
4	I was able to understand human relations.
5	I was able to understand teamwork.
6	I was able to understand interprofessional work.
7	I was able to understand the roles of medical professionals.
8	I was able to understand role theory.
9	I was able to understand conferences.
10	I was able to understand consultation.
11	I was able to understand coordination.
12	I was able to understand counseling.
13	I was able to understand communication in pre-hospital care situations.
14	I was able to deepen my learning through exercises on communication in pre-hospital care situations.
15	I was able to understand communication inside the ambulance.
16	I was able to deepen my learning through exercises on communication inside the ambulance.
17	I was able to understand communication upon hospital arrival.
18	I was able to deepen my learning through exercises on communication upon hospital arrival.
19	I was able to understand communication in the ER (Emergency Room).
20	I was able to understand communication in the Critical Care ICU (Intensive Care Unit).
21	I was able to deepen my learning through exercises on communication in the Critical Care ICU.
22	I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival.
23	I was able to hold discussions in a group.
24	Please freely write your impressions of taking this lecture.

2.5. Analysis Method

In this study, Repeated Measures ANOVA was conducted to verify the differences in the evaluations of the participants among all 23 question items. If a statistically significant difference was found in the main effect between items by ANOVA, the question with the highest mean value in descriptive statistics was

set as the "Reference group," and multiple comparisons were made with other questions. Note that in the multiple comparisons, considering that the questionnaire responses are on an ordinal scale, the Wilcoxon Signed-Rank Test was used, and p-values were corrected using the Holm method to control for Type I errors due to multiple testing. Statistical analysis was performed using the statistical software JASP (Version 0.95.4; JASP Team), and the significance level was set at less than 5%.

2.6. Ethical Considerations

This study was conducted with the approval of the Suzuka University of Medical Science Clinical Research Ethics Review Committee after strict review (Approval Number: 525). In conducting the research, the protection of the subjects' human rights and ethical considerations were thoroughly implemented as follows. The survey was conducted on the final class day of the course "Paramedic Communication". Prior to implementation, the principal investigator verbally explained the following matters in detail to all target students:

- The reason for conducting this questionnaire survey and the purpose of the research.
- Cooperation in the survey is completely voluntary and not mandatory.
- Submission of the questionnaire is considered consent to participate in this research study.
- It is possible to refuse participation or withdraw participation (withdraw consent) at any time, even after agreeing once.
- Exclusion of Disadvantage and Consideration for Grading: Regarding the impact on grading, which is the students' greatest concern, it was clearly explained that whether they agreed to this survey or the content of their questionnaire responses would not be reflected in the grade of the subject at all. To ensure transparency, the procedure was set to conduct and collect the questionnaire survey after the grade evaluation for the subject was completely finished and finalized. It was also explained that they would not suffer any disadvantage depending on the content of their answers when filling out the questionnaire.
- Ensuring Anonymity and Privacy Protection: The questionnaire adopted an "anonymous drop-off method". This is a method where students do not write their names on the answer sheet and, after answering, deposit it directly into a collection box placed in an environment where the researcher cannot touch it. This physically prevented the respondents from being identified, protected privacy, and promoted honest answers.
- Management of Personal Information and Data Disposal: Data obtained from the collected questionnaire sheets were anonymized so that individuals could not be identified at all. Electronic data was managed by the principal investigator and saved/stored on a storage medium such as a USB memory stick with a password lock. Research materials (questionnaire sheets and data) were to be

strictly stored for 10 years after the completion of the research, and then destroyed using a method that makes restoration impossible (shredding, complete data erasure, etc.). The publication of research results was limited to conference presentations and submissions to academic journals, and it was established that the data would not be used for purposes other than research. Extreme care was taken so that individuals would not be identified during presentations.

- Burden Reduction for Subjects: To prevent the time required to answer the questionnaire from becoming an excessive burden on students, the question format was structured mainly around a 5-choice format that could be answered simply, reducing the writing time. Although no compensation such as a gratuity was set for participation in this study, it was considered that there were no anticipated disadvantages or risks other than those mentioned above.

3. Results

Valid responses were obtained from 23 out of 42 students who registered for the course (valid response rate: 54.8%). In all 23 multiple-choice questions, the mean value ranged from 4.30 to 4.74, and a high evaluation of 4.0 or higher was obtained for all items. The details of the questionnaire results are as shown in Table 3.

Table 3. Results of the questionnaire survey conducted after taking "Paramedic Communication".

Question No.	Question Content	Mean	SD
1	I was able to understand communication in the emergency field.	4.39	±0.65
2	I was able to understand emotion.	4.43	±0.60
3	I was able to understand decision-making support.	4.39	±0.64
4	I was able to understand human relations.	4.35	±0.67
5	I was able to understand teamwork.	4.48	±0.53
6	I was able to understand interprofessional work.	4.50	±0.50
7	I was able to understand the roles of medical professionals.	4.43	±0.60
8	I was able to understand role theory.	4.48	±0.53
9	I was able to understand conferences.	4.35	±0.67
10	I was able to understand consultation.	4.30	±0.70
11	I was able to understand coordination.	4.43	±0.60
12	I was able to understand counseling.	4.48	±0.53
13	I was able to understand communication in pre-hospital care situations.	4.50	±0.50
14	I was able to deepen my learning through exercises on communication in pre-hospital care situations.	4.50	±0.50

Continued

15	I was able to understand communication inside the ambulance.	4.43	±0.60
16	I was able to deepen my learning through exercises on communication inside the ambulance.	4.39	±0.64
17	I was able to understand communication upon hospital arrival.	4.35	±0.67
18	I was able to deepen my learning through exercises on communication upon hospital arrival.	4.43	±0.60
19	I was able to understand communication in the ER (Emergency Room).	4.48	±0.53
20	I was able to understand communication in the Critical Care ICU (Intensive Care Unit).	4.48	±0.53
21	I was able to deepen my learning through exercises on communication in the Critical Care ICU.	4.35	±0.67
22	I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival.	4.50	±0.50
23	I was able to hold discussions in a group.	4.74	±0.44

To verify the differences in the evaluations of the participants among all 23 items, Repeated Measures ANOVA was conducted (see Table 4). Question 23, which had the highest mean value in descriptive statistics, was set as the "Reference group," and multiple comparisons were performed with other questions. The statistical rationale for selecting Question 23 as the baseline is that it represents the "importance of communication for paramedics," a core competency of this course that received the most successful internalisation by students. By using the highest-scoring item as a reference, the study aimed to statistically identify which other learning objectives showed significant gaps in achievement compared to this primary success. For multiple comparisons, the Wilcoxon Signed-Rank Test was used, considering the ordinal scale of the questionnaire. The p-values were corrected by the Holm method to control for Type I errors (see Table 5). Question 23 is an item, symbolizing active learning, and this was evaluated significantly higher than passive knowledge acquisition (lectures).

Table 4. Results of repeated measures ANOVA between questionnaire items.

Source	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-value (F)	*p*-value (*p*)
Question Items	5.41	22	0.246	1.709	0.024
Residuals (Error)	69.633	484	0.144		

3.1. Differences in Evaluation across the Whole

As a result of conducting Repeated Measures ANOVA on the responses to all 23 items, a statistically significant main effect was observed between questions ($F(22, 484) = 1.71$, $p = 0.024$). This indicates that the learners' degree of understanding

and sense of achievement were not uniform across question items, and significant differences existed between items.

Table 5. Multiple comparison with question 23 and other questions_Wilcoxon signed-rank test reference: With *p*-value correction by holm method.

Comparison Target (Question No.)	Question Content	W value	*p* value	Effect Size (rrb)
1	I was able to understand communication in the emergency field.	36	0.006**	1
2	I was able to understand emotion.	28	0.011*	1
3	I was able to understand decision-making support.	36	0.006**	1
4	I was able to understand human relations.	60	0.008**	0.818
5	I was able to understand teamwork.	21	0.020*	1
6	I was able to understand interprofessional work.	10	00.072	1
7	I was able to understand the roles of medical professionals.	21	0.020*	1
8	I was able to understand role theory.	21	0.020*	1
9	I was able to understand conferences.	45	0.003**	1
10	I was able to understand consultation.	55	0.002**	1
11	I was able to understand coordination.	55	0.002**	1
12	I was able to understand counseling.	17.5	00.129	0.667
13	I was able to understand communication in pre-hospital care situations.	24	00.073	0.714
14	I was able to deepen my learning through exercises on communication in pre-hospital care situations.	28	0.015*	1
15	I was able to understand communication inside the ambulance.	15	0.037*	1
16	I was able to deepen my learning through exercises on communication inside the ambulance.	36	0.006**	1
17	I was able to understand communication upon hospital arrival.	45	0.003**	1
18	I was able to deepen my learning through exercises on communication upon hospital arrival.	21	0.020*	1
19	I was able to understand communication in the ER (Emergency Room).	28	0.011*	1
20	I was able to understand communication in the Critical Care ICU (Intensive Care Unit).	28	0.011*	1
21	I was able to deepen my learning through exercises on communication in the Critical Care ICU.	36	0.008**	1
22	I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival.	10	0.072	1

$p < 0.05$*, $p < 0.005$**.

3.2. Comparison of Group Discussion (Question 23) and Other Items

Checking the descriptive statistics for each question, the mean value of "Q23. I was able to hold discussions in a group" was the highest at 4.74 (SD=0.44), followed by "6. I was able to understand interprofessional work," "Q13. I was able to understand communication in pre-hospital care situations," "Q14. I was able to deepen my learning through exercises on communication in pre-hospital care situations," and "Q22. I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival" (all mean 4.50).

Using Question 23, which had the highest evaluation, as the reference group, multiple comparisons (Holm-corrected Wilcoxon Signed-Rank Test) were performed with other questions. As a result, for the four items: "Q6. I was able to understand interprofessional work ($p = 0.072$)," "Q12. I was able to understand counseling ($p = 0.129$)," "Q13. I was able to understand communication in pre-hospital care situations ($p = 0.073$)," and "Q22. I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival ($p = 0.072$)," no large significant difference was observed compared to Question 23. However, these items received extremely high evaluations similar to Question 23, and can be said to be major areas where students understood particularly deeply and deepened their learning in this class.

4. Discussion

The results of this study suggest that the newly opened "Paramedic Communication" showed high mean values in all questions, achieved the initial objectives, and became a meaningful learning opportunity for the students. Below, the outcomes and issues of this course are discussed from multiple angles based on statistical evidence.

4.1. Deepening of "Meaning-Making" through Active Learning

In this analysis, the reason for setting "Q23. I was able to hold discussions in a group" as the reference group was based on the objective fact that this item showed the highest mean value (Mean = 4.74, SD = 0.44) in descriptive statistics. However, behind this numerical superiority lies an extremely important pedagogical suggestion in modern professional education.

Question 23 is an item symbolizing "Active Learning," where students themselves think, speak, and interact with others, rather than passive knowledge acquisition through lectures. As a result of multiple comparisons, this "Question 23" obtained a statistically significantly higher evaluation ($p < 0.05$) compared to the item group asking for conceptual understanding such as "Conferences (Question 9)" and "Consultation (Question 10)". Also, it was evaluated higher with a significant trend ($p < 0.10$) against Questions 1 - 4 asking for basic knowledge under-

standing.

Fletcher et al. (2022) state that for emergency personnel to maintain optimal performance under high-stress environments, Emotional Awareness and resilience are important. Additionally, Kaplan and Markenson's research (2024) suggests that the "Trait Emotional Intelligence (EI)" of emergency medical providers is related to turnover intention, and the ability to understand and manage emotions contributes to sustainability as a professional. The fact that students evaluated group discussion the highest is proof that they craved an intellectual process of questioning the meaning of their own actions and emotions, not just acquiring skills, and it can be said that the place for dialogue provided by this class satisfied that need.

In the syllabus of this course, it was intended to conduct feedback within the group after role-playing, perform "meaning-making" regarding the content, and connect it to self-reflection. Activities at emergency scenes are a continuous series of instantaneous judgments and treatments, but behind them, there is always a rationale for "why that communication was chosen". Group discussion functioned as a place for "Reflective Practice," where students verbalized the communication they performed intuitively and connected it with objective theory.

However, it must be noted that these high Likert scores primarily reflect the students' self-efficacy and perceived understanding rather than objectively verified clinical competence. While the results indicate a significant increase in student confidence and engagement, it is necessary to distinguish between this self-perceived proficiency and actual skill acquisition. Future evaluations should include objective clinical assessments to verify whether this increased confidence translates into practical proficiency in the field.

4.2. Awareness Transformation toward "Interprofessional Work" Anticipating Scope Expansion

One of the notable results of this study is that "Q6. I was able to understand interprofessional work" showed a high value of 4.50 on average, and no significant difference was observed with the reference group, Question 23. In qualitative research by Stoltzenburg et al. (2024)'s teamwork for ambulance professionals is not merely a technique but a complex process deeply rooted in trust and leadership, and training focusing on relationships within the core team and within the interprofessional collaboration system is considered important. In other words, students deeply accepted the important concept of interprofessional work at a level equivalent to the enjoyable activity of group discussion.

As stated in the introduction, active Paramedics feel difficulties in building relationships with hospital staff (physicians/nurses), and there is a current situation where they are prone to feelings of alienation as "outsiders" and stress due to communication failure. This is thought to be due to traditional education being too specialized in pre-hospital care, resulting in a lack of understanding of the hospital system and the culture of other professions.

The fact that "Roles of medical professionals (Question 7)" and "Role theory

(Question 8)" were highly evaluated in this class means that students established their own expertise (identity as Paramedics) while simultaneously acquiring a perspective of respect and collaboration with other professions. Especially now that the role of Paramedics has expanded to the Emergency Room (ER) due to the 2021 legal amendment, being able to have self-awareness as a "member of team medicine" from the student stage can be expected to have a preventive educational effect that reduces future reality shock and promotes smooth workplace adaptation.

4.3. Practical Integration through Simulation of "Sequence of Events"

It is also important that "Q22. I was able to deepen my learning through exercises on communication in the sequence of events: pre-hospital care situation, inside ambulance, and hospital arrival" obtained a high evaluation (Mean 4.50) among exercise items. Engebretsen et al. (2013) report that in transporting patients with long-term conditions, ambulance personnel feel difficulties in dialogue under busy and unpredictable situations, and high-quality communication accompanied by empathy and ethical consideration, not just mere information transmission, is indispensable. This item also had no significant difference from Question 23, statistically supporting that it was a core learning ground for students.

Emergency activities are not a collection of disconnected tasks but a process carried out within a continuous timeline. However, with only classroom lectures or partial practice (task training), it is difficult to learn the continuity of information during scene changes and the switching of communication according to situation changes.

In this course, from the 13th to the 15th session, a simulation was conducted to run through from scene arrival to hospital handover without interruption. Through this, it is considered that students were able to experientially understand the difficulty and importance of the "information baton pass (Continuity of Care)"—how to organize information obtained at the scene without degrading it inside the ambulance and summarize and convey it to the physician upon hospital arrival.

Also, within this "sequence of events," advanced skills are required to instantaneously switch between different qualities of communication: reception/manners toward the sick/injured (consideration for emotion) and reporting to medical personnel (transmission of medical information). The high evaluation for Question 22 can be interpreted as a manifestation of students' confidence in acquiring a certain level of response capability to this complex task through role-playing.

4.4. Issues and Educational Suggestions in Understanding Abstract Concepts

On the other hand, as a result of multiple comparisons, items that were evaluated statistically significantly lower compared to Question 23 were extracted: "Q9. I was able to understand conferences," "Q10. I was able to understand consultation," "Q11. I was able to understand coordination," and "Q17. I was able to understand communication upon hospital arrival". What these items have in com-

mon are concepts requiring "organizational coordination" or a "bird's-eye perspective," and are points of communication not "with patients" but "with systems/experts".

While these specific frameworks were not part of the current curriculum, their introduction as theoretical recommendations for future syllabus inclusion could be an effective solution to address these challenges. For example, the introduction of education on standardized tools like SBAR (Situation, Background, Assessment, Recommendation) proposed by Haig (2006) could be an effective solution. SBAR is a tool that structures reporting from nurses to physicians and handovers between multiple professions, enabling the entire team to have a "Shared Mental Model," and is widely popularized globally.

Concepts like Consultation (consulting experts) and Coordination (overall adjustment) are concepts whose necessity can only be truly felt with some practical experience or understanding of organizational structure. For students without clinical experience, it is highly likely that these concepts were high in abstraction and difficult to perceive as their own matters. The fact that Question 17 (upon hospital arrival) was relatively low may also reflect the difficulty of imagining the situation of negotiation with physicians in a tense handover scene, which has the highest psychological load.

In future class improvements, it is inferred that students' understanding can be deepened by incorporating more specific and practical scenarios, such as case studies using specific tools or knowledge education regarding Advance Care Planning as proposed by Hong et al. (2021). Also, it is necessary to devise ways to make students realistically image "why coordination is necessary" and "what happens if coordination fails" by incorporating guest lectures by active field Paramedics. By conducting case studies incorporating more elements of active learning, it is inferred that high learning effects similar to Question 23 can be obtained for these items as well.

5. Conclusion

As a result of statistically verifying the learning effects of the newly opened "Paramedic Communication" in the Department of Emergency Medical Science at this university, the following became clear:

- This study suggested that the newly opened "Paramedic Communication" showed high mean values in all questions, achieved the initial objectives, and became a meaningful learning opportunity for the students.
- Statistically significant differences in evaluation existed between question items, confirming that the degree of understanding was not uniform.
- Active learning items represented by "Group Discussion" were evaluated the highest, obtaining a significantly higher sense of achievement compared to knowledge-acquisition type items.
- Exercises on interprofessional work and the sequence of events also obtained high evaluations similar to group discussion, confirming practical educational

effects.

From the above, it is concluded that this course contributed to the foundation formation of communication skills necessary for paramedics, especially proactive involvement and collaboration.

6. Limitations and Remaining Issues

The present study has inherent limitations. First, the response rate (23 valid responses out of 42 students; 54.8%) presents a challenge to the validity of the findings. The exclusion of nearly half the cohort may introduce a selection bias, as students who viewed the course favorably or felt more engaged might have been more likely to respond. Therefore, the results may overrepresent the educational impact and high satisfaction levels. Additionally, the restricted scope—solely investigating students enrolled in the Paramedic Science Department at the authors' institution—limits the generalizability of the findings. Another constraint lies in the dual role of the researchers as the course instructors.

To address potential researcher bias in the current study, we implemented a protocol to ensure that the instructors could not identify individual respondents during the data aggregation and analysis process, thereby maintaining participant anonymity. However, to further mitigate bias and ensure more objective results in future investigations, it is essential to establish a clearer separation between the roles of "instructor" and "researcher" by involving independent external evaluators or data analysts.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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